C-A OPERATIONS PROCEDURES MANUAL

9.2.7 Design of Experimental Flammable Gas Systems

Text Pages 2 through 3

Attachments

Hand Processed Changes

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Approved: _____Signature On File_____ _____
Collider-Accelerator Department Chairman Date

A. Etkin

9.2.7 Design of Experimental Flammable Gas Systems

1. Purpose

1.1. This procedure describes design requirement for flammable gas systems used in experiments located in Collider – Accelerator Department facilities. In addition safety review requirements are given and some good practice guidance is provided.

2. **Responsibilities**

2.1. The responsible experimental system manager shall coordinate system design and review activity with the experiment's liaison engineer and physicist.

2.2. The experiment's liaison engineer and liaison physicist shall assist the experimental system manager with design and review activities.

2.3. The responsible system manager shall request the Collider – Accelerator Department Experimental Safety Review Committee [ESRC], as early as possible in the design stage, to review each flammable gas system to ensure they meet the requirements of Standard 1.4.1 Pressurized Systems for Experimental, 1.4.2 Glass and Plastic Window Design for Pressure Vessels, 4.10.2 Flammable Liquids: Storage, Use, & Disposal, 4.11.0 Installation of Flammable Gas Systems (Experimental and Temporary Installations)or 4.12.0 Special Precautions for Locations Containing Flammable Atmospheres.

2.4. The responsible system manager shall provide a safety analysis to the ESRC.

2.5. The responsible system manager shall ensure that the analysis, review and approval are completed prior to operation or prior to incorporation of a change in system configuration affecting safety, preferably prior to construction of the system.

3. **Prerequisites**

3.1. None.

4. **Precautions**

4.1. None.

5. Procedures

5.1. The design of the gas system shall follow the guidance in attachment 9.2.7a.

5.2. The associated environment and procedures shall follow the guidance in attachment 9.2.7b.

5.3. The design of the flammable gas distribution systems shall have a flow limiting orifice for which the maximum limiting flow at maximum supply pressure has been determined.

5.4. Distribution of flammable gas shall be armored in metal jacketed lines for fixed

runs and for flexible lines up to the flow limiting orifice.

5.5. The design of flammable gas systems for experimental use shall be reviewed by the Experimental Safety Review Committee (ESRC) prior to fabrication.

5.5.1. A proposal for the inventory of gas stored inside a building for normal (quiescent) operation shall be presented to the Experimental Safety Review Committee (ESRC). The requested supply shall not, under any circumstance, exceed a one week supply. Depending on the volume of flammable gas proposed as storage, this amount may be reduced by the ESRC. The ESRC may require fill/purge volumes to be provided from bulk liquid, tube trailers, etc.

5.5.2. Complete, concise and accurate Process and Instrumentation Drawings [P&IDs] shall be prepared. The final P&IDs shall be signed off as checked, reviewed and approved prior to routine operation.

5.5.3. For systems containing more than 2 cubic meters @ STP of flammable gas an FMEA shall be prepared and approved prior to normal operation. See attachment 9.2.7.c.

6. Documentation

6.1. Completed P&ID.

6.2. Documentation specified in procedure and attachments.

7. References

None

8. Attachments

8.1. C-A-OPM-ATT 9.2.7.a, “General Design Criteria For Experimental Flammable Gas Systems”

8.2. C-A-OPM-ATT 9.2.7.b, “Design Criteria For Experimental Flammable Gas System Environment”

8.3. C-A-OPM-ATT 9.2.7.c, “Failure Mode and Effects Analysis”